# CAREERS IN CONSTRUCTION MATH CHALLENGE!

Instructions:

Work together as a team to complete the tasks below. You may divide your team in to "crews" responsible for each task or complete each task together.

Each task represents a construction craft that contributes the the success of the final construction project. Submit completed answers to all questions to your teacher to grade.

1 Carpentry Task

a. Find the perimeter of the building below:
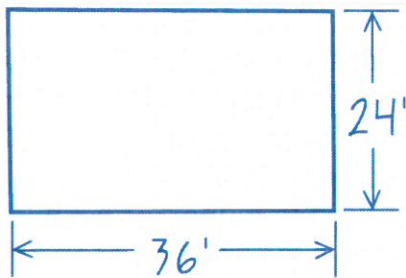
b. Assume your team is buying **12ft** 2x6s for the sill plates. Determine **the number of 2x6s** your team will need to frame the above building.

c. If your team uses one 2 X 4 stud per foot of perimeter, calculate **the number of studs** you will need if each is placed 16 inches apart from the center of each stud.

TRICK OF THE TRADE

Construction estimators will assume the use of one 2 X 4 stud per foot of perimeter. Since each corner needs at least 3 studs, and each opening needs two studs on each side, using the one-stud-per-foot trick compensates for these additional studs without guesswork.
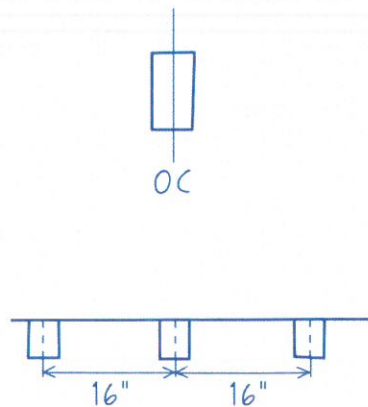

2 Plumbing Task

a. Your team needs to fabricate the pipe joints shown in the diagram below. The center to face measurement of the entire pipe joint is 18 inches. Fitting A has a 1 ¾ inch fitting allowance. Fitting B has a 1 ⅞ fitting allowance. Calculate the length of the pipe between the fittings.
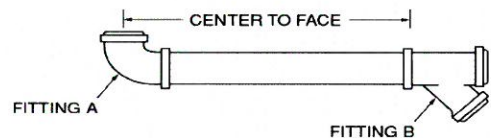
b. Your team wants to move the kitchen sink to the right by one foot. This will require moving the hot and cold water lines to the right. When you change the direction of a pipe it is referred to as "offsetting." Calculate the length of the pipe you will need if the offset is 12 inches. (Hint use Pythagorean Theorem)
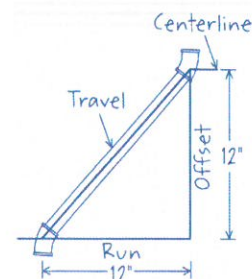
TRICK OF THE TRADE

Understanding the ratios that exist in right triangles help plumbers to quickly calculate the lengths of pipes and offset angles. An aspiring plumber who is familiar with sine, cosine and tangent is off to a headstart!
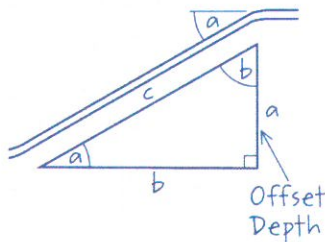
3 Electrical Task

a. A circle has a radius of 1 1/4 inches. What is the diameter? What is the circumference?

b. Determine the length of the wire (travel) your electrical team will need to bend to get to the junction box if the offset depth is 1 1/2 inches and the base is 1 1/4 inches. Use the Pythagorean theorem and the figure below.

4 HVAC Task

a. Your team is installing a heating and air conditioning unit. You need to pour a concrete slab to set it on. If the space is 8 inches wide, 7 feet deep and 9 ft long, what is the **volume of the slab** in cubic feet?
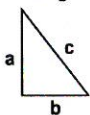
DID YOU KNOW?

When you talk about a heating system, you are talking about adding heat to the air in a house. For an air conditioning system, you are removing heat from the house.
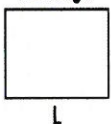
Handy Construction Formulas
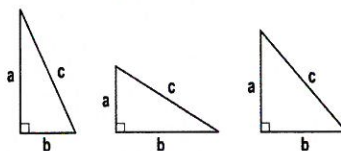
Perimeter

Triangle

Perimeter = a + b + c

Rectangle

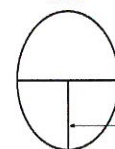Perimeter = L + L + W + W <u>or</u> 2L + 2W

Pythagorean theorem

Side a is the rising side. Remember it with the word altitude. Side b is the base. Side c is always the long side of the triangle.

Circumference

Circle

Circumference = πd or 2πr

Diameter (d)

Radius (r)

Math Competition Grading Rubric

Team Name: _____

Grade: _____

Number of Team Members_____

Question Number	Section	Answer	Section Value	Exceptions	Score
1.	a	120 feet	2 points	To receive full credit, answer must include: 1. correct perimeter 2. correct unit of measurement	/2
	b	10 sill plates	2 points	To receive full credit, answer must include: 1. use of perimeter from part a. 2. correct number of sill plates	/2
	c	90 studs	3 points	To receive full credit, answer must include: 1. use of perimeter from part a. 2. covert feet to inches 3. correct number of studs per foot of perimeter	/3
2.	a	16 ¼ inches	2 points	To receive full credit, answer must include: 1. correct length 2. correct unit of measurement	/2
	b	16.97 inches	2 points	To receive full credit, answer must include: 1. correct length of unknown side 2. correct unit of measurement	/2
3.	a	Diameter = 2.5 inches Circumference = 7.85 inches	3 points	To receive full credit, answer must include: 1. correct diameter 2. correct	/3

				circumference 3. correct units of measurement	
	b	1.9525 inches	2 points	To receive full credit, answer must include: 1. correct length 2. correct unit of measurement	/2
4.	a	1.25 square ft	2 points	To receive full credit, answer must include: 1. use area formula 2. convert inches to feet	/2
	b	925 cfm	1 point	To receive full credit, answer must show: 1. correct use of formula provided	/1
	c	70.37 kg	1 point	To receive full credit, answer must include: 1. correct conversion from pounds to kilograms	/1
					Total Score
					/20

Judge: _____